

REMARKS

The present application has been reviewed in light of the Office Action dated January 26, 2010. Claims 1-3, 5-10, 14, and 16 are presented for examination, of which Claims 1, 14, and 16 are in independent form. Claims 1, 14, and 16 have been amended to define aspects of Applicant's invention more clearly, and the other claims have been amended as to matters of form. Favorable consideration is requested.

The Office Action raised objections to Claims 1 and 14 for minor informalities, which have been corrected herein. Accordingly, withdrawal of the objections is respectfully requested.

The Office Action states that Claims 1-3, 7, 8, 14, and 16 are rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,999,185 (Kato et al.) in view of U.S. Patent No. 6,545,663 (Arbter et al.); that Claims 5 and 6 are rejected under § 103(a) as being unpatentable over Kato et al. in view of Arbter et al., and further in view of U.S. Patent No. 6,118,427 (Buxton et al.); and that Claims 9 and 10 are rejected under § 103(a) as being unpatentable over Kato et al. in view of Arbter et al., and further in view of U.S. Patent No. 5,923,333 (Stroyan). For at least the reasons presented below, Applicant submits that independent Claims 1, 14, and 16, together with the claims dependent therefrom, are patentably distinct from the cited references.

Claim 1 is directed to an image processing method that generates a display image of a virtual space including a virtual object consisting of at least one part. A first acquisition step of the method acquires a position and an orientation of a viewpoint of an observer; and a second acquisition step of the method acquires a position and an orientation of a pointing device. A

specification step specifies a part that is included in a virtual object and is designated by the pointing device, based on positions of one or more parts included in the virtual object and the position and the orientation of the pointing device.

A calculation step of the method calculates a position of a list image in the virtual space based on the positions of the viewpoint and the pointing device. The calculated position of the list image is near the position of the pointing device and closer to the position of the viewpoint than that of the pointing device. The list image represents information of the specified part.

A layout step of the method lays out the list image at the calculated position in a virtual space. A virtual space image generation step generates a display image of the virtual space, in which the laid out list image and the virtual object are included, based on the acquired position and orientation of the viewpoint. A composition step composes the generated display image of the virtual space and an image of a physical space seen in accordance with the position and the orientation of the viewpoint to display the composed image at a head mounted display mounted on the observer's head.

Support for the specification step and the calculation step may be found, for example, on pages 22-24 of the specification.¹

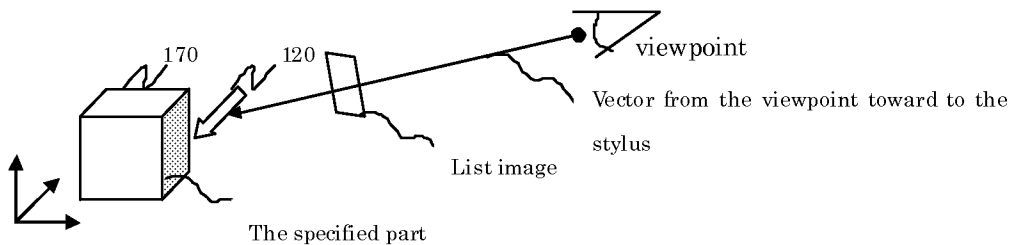
By way of background, Claim 1 relates to a technique for displaying a list image, such as depicted in Figs. 7-9, for example. First, an operator moves a stylus 120 to one of a number of parts included in a virtual object 170 and presses a stylus button 122. After pressing

¹Any examples presented herein are intended for purposes of illustration and are not to be construed to limit the scope of the claims.

the stylus button 122, a part closest to a position of the stylus 120 is specified from the parts, and information about the specified part is displayed as the list image.

Generally, a display area of a HMD (head mounted display) is relatively small. Thus, when all the parts of the virtual object are displayed on the display area of the HMD, it is difficult for a user wearing the HMD to observe other contents displayed on the display area, such as other virtual objects, physical space images, and the like. Furthermore, when the list image is laid out at an arbitrary position in the virtual space, a sense of discomfort can be generated with respect to the depth of objects, such as between the list image and other display contents.

The method of Claim 1 addresses the above-noted problem by calculating a position of the list image in the virtual space based on the positions of the viewpoint and the pointing device. That is, by virtue of the second acquisition step, the specification step, the calculation step, the layout step, and the virtual space image generation step, the list image may be displayed in accordance with the viewpoint of the observer:



As noted on page 25, line 25, to page 26, line 6, of the specification: “When the list image is displayed in the above manner, the list image (assembly tree) is not occluded by another image practically. In addition, the list image is displayed at almost the same depth as the stylus 120 held in the hand. Hence, even in stereoscopic vision, no sense of discomfort is generated in the stereoscopic vision by binocular parallax by an extreme difference in the stereoscopic vision.”

Applicants submit that Kato et al. fails to teach a system that can display a list image as described above in connection with Claim 1. Kato et al. relates to a system for improving “naturalness” in virtual-reality images. Column 17 of Kato et al. describes the flowchart shown in Fig. 13 therein. As understood by Applicants, in S121 of the flowchart, a translation amount of a viewpoint and a reference point is determined according to an input from a data glove. In S122 of the flowchart, a position of an object to be displayed is determined based on the viewpoint and the reference point. At lines 30-43 of column 17, it is described that a constraint is used to determine the position of the object. That is, Kato et al. in S122 describes a method for determining the position of the object, but does not teach or suggest a technique for calculating a position of a list image so that the calculated position of the list image is near a position of the pointing device and closer to a position of an observer’s viewpoint than that of the pointing device.

Columns 28 and 29 of Kato et al. describe the system shown in Fig. 35 thereof. Apparently, the system selects real data acquired by a real data acquisition unit or texture output from a texture memory unit according to the distance from a viewpoint. Applicants submit that this system and its operation are different from the method of Claim 1.

Arbter et al. relates to a system for controlling an object in virtual reality.

Apparently, Arbter et al. in Figs. 1 and 2 discloses a technique for recognizing a translation amount of a physical model object 6 and controlling a display image when a user operates the physical model object 6. It is respectfully submitted that this technique is different from the calculation and layout steps of Claim 1.

In summary, Applicant submits that a combination of Kato et al. and Arbter et al., assuming such combination would even be permissible, would fail to teach or suggest an image processing method of generating a display image of a virtual space including a virtual object consisting of at least one part, in which the method includes “a calculation step of calculating a position of a list image in the virtual space based on the positions of the viewpoint and the pointing device, wherein the calculated position of the list image is near the position of the pointing device and closer to the position of the viewpoint than that of the pointing device, wherein the list image represents information of the specified part,” and “a layout step of laying out the list image at the calculated position in a virtual space,” and “a virtual space image generation step of generating a display image of the virtual space, in which the laid out list image and the virtual object are included, based on the acquired position and orientation of the viewpoint,” and “a composition step of composing the generated display image of the virtual space and an image of a physical space seen in accordance with the position and the orientation of the viewpoint to display the composed image at a head mounted display mounted on the observer’s head,” as recited in Claim 1. Accordingly, Applicant submits that Claim 1 is patentable over the cited art, and respectfully request withdrawal of the rejection under 35 U.S.C. § 103(a).

Independent Claims 14 and 16 include features sufficiently similar to those of Claim 1 that these claims are believed to be patentable for at least the reasons discussed above. The other claims in the present application depend from Claim 1 and are submitted to be patentable for at least the reasons discussed above. However, because each dependent claim also is deemed to define an additional aspect of the invention, individual consideration of the patentability of each claim on its own merits is respectfully requested.

In view of the foregoing amendments and remarks, Applicants respectfully request favorable consideration and early passage to issue of the present application.

No petition to extend the time for response to the Office Action is deemed necessary for this Amendment. If, however, such a petition is required to make this Amendment timely filed, then this paper should be considered such a petition and the Commissioner is authorized to charge the requisite petition fee to Deposit Account 50-3939.

Applicant's undersigned attorney may be reached in our New York Office by telephone at (212) 218-2100. All correspondence should continue to be directed to our address listed below.

Respectfully submitted,

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